8. The mass spectrometer of claim 1, wherein the mass spectrometer is configured to transmit ions of the ion beam through the ion optical device along an axis.

9. The mass spectrometer of claim 8, wherein the mass spectrometer is configured such that neutral gas of the unwanted gas components diverges from the axis at the ion optical device.

10. The mass spectrometer of claim 9, wherein the mass spectrometer is configured to deflect the ion beam off the axis upstream of the mass-to-charge analyzer.

11. The mass spectrometer of claim 1, wherein the mass spectrometer is configured such that the ion beam extends along a path that includes a first portion in which ions are transmitted along an axis and a second portion in which the ion beam is deflected off the axis upstream of the mass-to-charge analyzer.

12. The mass spectrometer of claim 11, further comprising a deflector to deflect the ion beam off the axis upstream of the mass-to-charge analyzer.

13. The mass spectrometer of claim 12, wherein the deflector comprises a double deflector.

14. The mass spectrometer of claim 12, wherein the deflector comprises an electrostatic sector.

15. The mass spectrometer of claim 14, wherein the electrostatic sector comprises two cylindrical electrostatic sectors in series.

16. The mass spectrometer of claim 11, wherein the mass spectrometer is configured to deflect the ion beam off the axis downstream of the collision cell.

17. The mass spectrometer of claim 1, wherein the mass spectrometer is configured such that the ion beam passes along a path and neutral gas of the unwanted gas components diverges from the path.

18. The mass spectrometer of claim 1, wherein the ion optical device is configured such that the at least a portion of the ion beam received by the collision cell is substantially free of neutral gas components from the ion source.

19. The mass spectrometer of claim 1, further comprising an ion optical device disposed within the collision cell, the ion optical device configured for containing the ion beam as it passes through the collision cell.

20. The mass spectrometer of claim 1, further comprising a first pump for maintaining the evacuation chamber at a first vacuum pressure, and a second pump for maintaining the analyzing chamber at a second vacuum pressure.

21. The mass spectrometer of claim 1, further comprising an intermediate evacuation chamber in which the ion optical device is disposed.

22. The mass spectrometer of claim 21, further comprising a first pump for maintaining the intermediate evacuation chamber at a first vacuum pressure, and a second pump for maintaining the evacuation chamber at a second vacuum pressure lower than the first vacuum pressure.

23. A method of operating a mass spectrometer, the method comprising the steps of:

generating at an ion source an ion beam from a sample, the beam containing unwanted gas components and artifact ions from the ion source;

reducing gas loading from the ion source on a collision cell, the reducing occurring upstream of the collision cell;

pressurizing the collision cell with a target gas for removing unwanted artifact ions from the ion beam in the collision cell;

receiving in the collision cell at least a portion of the ion beam substantially free of neutral gas components from the ion source; and

receiving at least a portion of the ion beam from the collision cell in a mass-to-charge ratio analyzer.

24. The method of claim 23, wherein reducing gas loading comprises passing the ion beam through a transmission enhancing device.

25. The method of claim 24, wherein reducing gas loading comprises transmitting ions of the ion beam through the transmission enhancing device along a first axis.

26. The method of claim 24, wherein reducing gas loading comprises diverging neutral gas of the unwanted gas components from the first axis.

27. The method of claim 24, further comprising transmitting some of the ions from the ion source through a sampling aperture into an evacuated expansion chamber upstream of the transmission enhancing device.

28. The method of claim 24, wherein the ion transmission enhancing device is located within an intermediate evacuation chamber, the collision cell is located within an evacuation chamber, and the method includes evacuating the intermediate evacuation chamber to a first vacuum pressure, and evacuating the evacuation chamber to a second vacuum pressure that is lower than the first pressure.

29. The method of claim 23, wherein the collision cell is located within an evacuation chamber, the mass-to-charge ratio analyzer is located within an analyzer chamber, and the method includes evacuating the evacuation chamber to a first vacuum pressure, evacuating the analyzer chamber to a second vacuum pressure that is lower than the first pressure.

30. The method of claim 23, wherein the ion beam includes a portion in which ions are transmitted along an axis, and the method comprises deflecting the ion beam off the axis upstream of the mass-to-charge analyzer.

31. The method of claim 30, wherein deflecting the ion beam includes electrostatically deflecting the ion beam.

32. The method of claim 30, wherein deflecting the ion beam includes twice deflecting the ion beam.

33. The method of claim 30, wherein the ion beam is deflected off the axis downstream of the collision cell.

34. The method of claim 23, wherein the ion beam passes along a path and neutral gas of the unwanted gas components diverges from the path.

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